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MACROECONOMIC DETERMINANTS OF STOCK MARKET DEVELOPMENT

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Using pooled data from fifteen industrial and developing countries from 1980 to 1995, this paper examines the macroeconomic determinants of stock market development, particularly market capitalization. The paper finds that: (1) real income, saving rate, financial intermediary development, and stock market liquidity are important determinants of stock market capitalization; (2) macroeconomic volatility does not prove significant; and (3) stock market development and financial intermediary development are complements instead of substitutes.

Introduction

Ever since the pioneering contributions of Gurley and Shaw (1955, 1960, 1967), McKinnon (1973) and Shaw (1973), the relationship between financial development and economic growth has been an important issue of debate. Numerous studies have dealt with different aspects of this relationship at both theoretical and empirical levels.

The broadest division of a financial system is between financial intermediaries (banks, insurance companies, and pension funds) and markets (bond and stock markets). A large part of an economy's savings are intermediated towards productive investments through financial

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intermediaries and markets. Since the rate of capital accumulation is a fundamental determinant of long-term growth, an efficient financial system is essential for an economy.

Earlier research emphasized the role of the banking sector in economic growth. In the past decade, the world stock markets surged, and emerging markets accounted for a large amount of this boom.[2] Recent research has therefore begun to focus on the linkages between the stock markets and economic development. New theoretical work shows how stock market development might boost long-run economic growth, and new empirical evidence supports this view. For example, Demirguc-Kunt and Levine (1996a), Singh (1997), and Levine and Zervos (1998) find that stock market development plays an important role in predicting future economic growth. *The World Bank Economic Review* also dedicates its May 1996 issue to the role of the stock markets in economic growth.

It is by now widely recognized that a well functioning financial system is crucial to economic growth. As part of the financial system, the stock markets play important roles in economic growth. Then, the question of what determines stock market development, becomes important. However, surprisingly, little work has been done on this issue. In this paper, we study the macroeconomic determinants of stock market development and shed some light on this issue.

Stock market development is a multi-dimensional concept. It is usually measured by stock market size, liquidity, volatility, concentration, integration with world capital markets, and the legal rule (regulation and supervision) in the market. We use market capitalization as a measure for stock market development in this study. We believe it is a good proxy for such general development because it is less arbitrary than other individual measures and indexes of stock market development.[3]

[2] See Demirguc-Kunt and Levine (1996a) for a more detailed discussion on recent surge in stock markets.

[3] For examples of stock market development indexes, see Levine and Zervos (1996) and Demirguc-Kunt and Levine (1996b).

The purpose of this paper is to explain the differences in stock market development in the major stock markets in Latin America as compared with those in East Asia and selected industrial countries. We use pooled data for fifteen countries from 1980 to 1995. These countries include seven countries in Latin America, six countries in East Asia, and two industrial countries: the United States and Japan.

We examine the effects of real income, saving rate, financial intermediary development, stock market liquidity, and macroeconomic stability on stock market capitalization. We investigate if these macroeconomic factors help predict future stock market development.

Demirguc-Kunt and Levine (1996b) have found that most stock market indicators are highly correlated with the financial intermediary development. Countries with well-developed stock markets tend to have well-developed financial intermediaries. Then, in addition, we intend to investigate if this positive relationship between financial intermediary development and stock market development exists in our sample.

The rest of the paper is organized as follows. Section II broadly reviews the literature on financial development and economic growth. Section III explains the methodology and discusses measures of the macroeconomic determinants of stock market capitalization. Section IV presents empirical evidence including summary statistics of some indicators, the panel regression results, and the correlations between financial intermediary development and stock market development. Section V provides policy implications and concludes the paper.

II. Financial Development and Economic growth

A. The Role of the Financial Sector in an Economy

The main reason why an efficient financial system is essential to an economy is that there are substantial information and transactions costs.

Asymmetric information creates adverse selection and moral hazard, and high transactions costs impose inefficiencies. By specializing in collecting information, evaluating projects, sharing risks, and providing liquidity, an efficient financial system increases financial savings, and improves their allocations across investments. Consequently, financial intermediation increases capital productivity, and promotes economic growth.

We have identified three main channels through which financial intermediaries and markets may affect economic growth. First, a developing financial sector makes room for increasing saving rates. By using economies of scale and expertise, financial intermediaries and markets are able to provide savers with a relatively higher yield, and therefore stimulate savings. A lot of literature has shown the role played by financial intermediaries and markets in increasing savings. For example, McKinnon (1973) and Shaw (1973) emphasize the role played by financial liberalization in increasing savings and, hence, investment. They claim that financial deepening improves not only productivity of capital but also the saving rate and, therefore, investment and growth.

Second, by reducing information and transactions costs, the financial intermediaries and markets perform the essential economic function of increasing the funneling of funds from lenders to borrowers. For example, Gurley and Shaw (1955, 1960 and 1967) stress the importance of financial intermediation in channeling savings to investment.

Third, the financial sector improves the allocation of resources. A recent line of research argues forcefully that financial development enhances growth by promoting an efficient allocation of investment through various mechanisms: (1) fund pooling, that is, making large investment projects possible and lending cheaper; (2) risk diversification, that is, reducing productivity and default risks by holding diversified portfolios; (3) liquidity management, that is, providing liquidity to investment projects; (4) screening, that is, gathering and evaluating information on projects to channel funds to the most profitable ones; (5) monitoring, that is, disciplining borrowers'

performance to make sure they fulfill their commitments. A well functioning financial system improves resource allocation through these mechanisms.[4]

B. Stock Market Development and Economic Growth

Notice that indirect finance through the financial intermediaries is many times more important than direct finance through the financial markets, especially in developing countries. Therefore, most existing literature focuses on the contributions of the financial intermediaries to economic growth.[5]

Numerous empirical tests have shown that financial variables have important impacts on economic growth. However, most of the evidence uses bank-based measures of financial development such as the ratio of liquid liability of financial intermediaries to GDP and domestic credit to the private sector divided by GDP. Not until recently has the emphasis increasingly shifted to stock market indicators, due to the increasing role of financial markets in economies.

For example, Atje and Jovanovic (1993) test the hypothesis that the stock markets have a positive impact on growth performance. They find significant correlations between economic growth and the value of stock market trading divided by GDP for 40 countries over the period 1980-88. Similarly, Levine and Zervos (1996, 1998) and Singh (1997) show that stock market development is positively and robustly associated with long-run economic growth.

In addition, using cross-country data for 47 countries from 1976-93, Levine and Zervos (1998) find that stock market liquidity is positively and significantly correlated with current and future rates of economic growth,

[4] For a detailed discussion and literature review on these mechanisms, see, for example, Liu (1998).

[5] For a comprehensive review of the theoretical and empirical studies on financial intermediary development and economic growth, see, for example, World Bank (1989), Levine (1997), and Liu (1998).

even after controlling for economic and political factors. They also find that measures of both stock market liquidity and banking development significantly predict future rates of growth. They, therefore, conclude that stock markets provide important but different financial services from banks.

Furthermore, using data from 44 industrial and developing countries from 1976 to 1993, Demirguc-Kunt and Levine (1996a) investigate the relationships between stock market development and financial intermediary development. They find that countries with better-developed stock markets also have better-developed financial intermediaries. Thus, they conclude that stock market development goes hand-in-hand with financial intermediary development.

Existing models suggest that stock market development is a multifaceted concept, involving issues of market size, liquidity, volatility, concentration, integration with world capital markets, and institutional development.

Using data on 44 developed and emerging markets from 1986 to 1993, Demirguc-Kunt and Levine (1996a) find that large stock markets are more liquid, less volatile, and more internationally integrated than smaller markets. Furthermore, institutionally developed markets with strong information disclosure laws, international accounting standards, and unrestricted capital flows are larger and more liquid markets.

Theory also points out a rich array of channels through which the stock markets — market size, liquidity, integration with world capital markets, and volatility — may be linked to economic growth.

For example, Pagano (1993) shows the increased risk-sharing benefits from larger stock market size through market externalities, while Levine (1991) and Bencivenga, Smith, and Starr (1996) show that stock markets may affect economic activity through the creation of liquidity. Similarly, Devereux and Smith (1994) and Obstfeld (1994) shows that risk diversification through internationally integrated stock markets is another vehicle through which the stock markets can affect economic growth.

Besides stock market size, liquidity, and integration with world capital markets, theorists have examined stock return volatility. For example, DeLong

et.al. (1989) argue that excess volatility in the stock market can hinder investment, and therefore growth.

C. The Direction of Causality between Financial Development and Economic Growth

It is now well recognized that financial development is crucial for economic growth. However, the relationship can go the other direction. In other words, economic growth can also promote financial development.

Recent literature on growth deals with this causal relationship along three lines: (1) financial deepening stimulates economic growth; (2) economic growth promotes the development of the financial sector; and (3) a circular relationship that financial development and economic growth simultaneously affect each other. Below we briefly discuss these three types of causal relationships.

First, *financial development causes economic growth.* Some analyses suggest that financial development has a causal influence on economic growth. That is, deliberate creation of financial institutions and markets increases the supply of financial services. The financial sector increases savings, and allocates them to more productive investments. Thereby financial development can stimulate economic growth. For example, findings in McKinnon (1973), Shaw (1973), and King and Levine (1993a, b, c) support this hypothesis.

Second, *economic growth causes financial development.* Some analyses postulate a causal relationship from economic growth to financial development. This hypothesis stresses the passive role of the financial system. In this view, financial development appears as a consequence of the overall economic development. Continual economic expansion requires more financial services and new instruments. The financial system adapts itself to the financing needs of the real sector and fits in with its autonomous development. Therefore, this type of financial development plays a rather passive role in the growth process. For example, Gurley and Shaw (1967)

and Goldsmith (1969) show that, economic growth propels financial development.

Third, *the reciprocal relationships.* This third view stresses the reciprocal relationship between financial development and economic growth. Economic growth makes the development of financial intermediation system profitable, and the establishment of an efficient financial system permits faster economic growth. By specializing in fund pooling, risk diversification, liquidity management, project evaluation and monitoring, the financial system improves the efficiency of capital allocation and increases the productive capacity of the real sector. At the same time, the technological efficiency of the financial sector increases with its size, because economies of scale and learning-by-doing effects are present in financial intermediation activities. As a result, the real sector can exert a positive externality on the financial sector through the volume of savings. Therefore, financial development and economic growth positively influence each other in the process of development.

In reality, the financial and real sectors interact during all stages of development. In other words, there is, at no stage, only a one-way relationship between financial development and economic growth. Thus, more and more authors prefer describing the relationship as a two-way causation now.

So far, many empirical studies have demonstrated the existence of a positive correlation between financial development and economic growth. However, these studies do not always establish the direction of the causality between these two variables, and those that do seek to identify the direction of the causality often lead to ambiguous conclusions.[6]

D. Determinants of stock market development

We will focus on stock market capitalization as the proxy for stock market

[6] See, for example, Liu (1998) for a review on evidence of causal relationship between financial and economic development.

development. We concentrate on market capitalization rather than constructing a composite index of stock market development because market capitalization is a good proxy for such general development and it is less arbitrary than any other index. In addition, Demirguc-Kunt and Levine (1996b) have shown that different individual measures and indexes of stock market development are highly correlated.

During the seventies and eighties we observed high and sustained economic growth in most East Asian countries in contrast to the low and stop-go growth in most Latin American countries. We also observed, during that period, higher market capitalization in East Asia than in Latin America. We intend to explain such differences in stock market development by examining the role of macroeconomic factors such as real income, saving rate, financial intermediary development, stock market liquidity, and macroeconomic volatility. We discuss the rationale of choosing these variables in section III.

In addition, we examine the relationship between financial intermediary development and stock market development. Usually there are two sources of corporate finance, debt and equity. Correspondingly, financial intermediaries and markets are often viewed as alternative vehicles for financing corporate investments. Demirguc-Kunt and Levine (1996b) have shown that countries with well-developed financial intermediaries tend to have well-developed stock markets. We intend to examine if this complementary relationship exists in our study.

III. Methodology and Data

There are two approaches to assess stock market capitalization, one is institutional and the other is macroeconomic.[7] The institutional approach looks at institutional factors such as property rights, clearance and settlement

[7] For a discussion of these two approaches to explain economic performance, see, for example, Olson, Jr. (1996).

issues, transparency and the inside information problems, taxation issues, and accounting standards. The macroeconomic approach looks at factors such as income growth, savings and investment, financial development, and inflation.

As we know, both institutional and macroeconomic factors are important in stock market development. Pagano (1993) shows that regulatory and institutional factors may influence the functioning of stock markets. For example, mandatory disclosure of reliable information about firms may enhance investor participation, and regulations that instill investor's confidence in brokers should encourage investment and trading in the stock markets.

However, we take the macroeconomic approach in this study. There are three reasons for doing so. First, accurate information on institutional variables is limited for many of our sample countries. Second, to our best knowledge, macroeconomic determinants of stock market development have not been studied before, while institutional determinants have. For example, using data from forty-nine countries, La Porta, Lopez-de-Silanes, Shleifer and Vishny (1996) find that institutional variables such as rule of law, antidirector rights and one-share = one-vote are important predicators of stock market development. Furthermore, some authors take the institutional approach for an individual country. For example, Miller (1991) finds that in Sweden the (securities) transaction tax was, by far, the highest in the world. Similarly, Ness and Martinez (1997) examine the effects of the institutional factors on Argentine and Brazilian stock markets.

Third, institutional factors are directly reflected in macroeconomic factors. It has been shown that some institutional measures such as legal rule are highly correlated with stock market liquidity, while stock market liquidity is one of the macroeconomic determinants we examine in this paper. For example, Demirguc-Kunt and Levine (1996b) find that countries with well-developed regulatory and institutional systems tend to have large, liquid stock markets.

This paper focuses on the determinants of stock market capitalization - defined as the total market value of all listed shares divided by GDP- as a

proxy for stock market development.[8] Our main interest is in the performance of the major emerging markets in Latin America vis-à-vis the performance in East Asia. To add some more information, we include two industrial countries, the United States and Japan, in our sample. We conduct panel analysis on pooled data from 15 selected countries from 1980 to 1995. These 15 countries include Argentina, Brazil, Chile, Colombia, Mexico, Peru, Venezuela, Indonesia, Korea, Malaysia, the Philippines, Taiwan, Thailand, Japan and the United States.[9] We select these countries because they are the major economies from Latin America, East Asia, and industrial countries, and data are available for them.

Second, consider *real income and income growth rate.* Real income has been found to be highly correlated with the stock market size. Higher volume of intermediation through stock markets causes higher real income growth. High income growth in turn promotes development in the stock market. As income increases, its cyclical component should impact the size of the stock market and its price index.

In addition, because higher income usually goes hand in hand with better defined property rights, better education, and a better general environment for business, we expect it to have a positive effect on the stock market size[10].

We use real GDP in U.S. dollars to measure the income level and calculate the real income growth rate. To avoid the causality problem, we simply use last year's income level and growth rate in the regressions.

Third, consider *the savings and investment.* Like financial intermediaries,

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[8] Since the market capitalization value is measured at the end of the year, and GDP is measured over the year, there is a stock-flow problem in this measure. To solve this problem, we use the average of two consecutive end-of-year market capitalization to estimate the mid-year value.

[9] We do not include China due to data limitation.

[10] The institutional approach of La Porta and others (1996) sheds some light on the rationale for positive income effect on stock market size. Their regressions find that per-capita income is a crucial variable in explaining the enforcement of legal rights and the quality of accounting standards, which are important predictors for stock market development.

stock markets intermediate savings to investment projects. Usually the larger the savings, the higher the amount of capital flows through stock markets. However, savings may not be highly correlated with income in our sample. In fact in Latin America during the last several years it is negatively correlated, probably due to the sizable capital flows. Thus, we expect savings and investment to be important determinants of stock market capitalization. Again, to avoid the causality problem, we use last year's saving or investment rate in the regressions.

Fourth, consider *financial intermediary development.* Since both the banking sector and stock markets intermediate savings towards investment projects, they can be either complements or substitutes. From the "demand for funds" point of view, the Modigliani-Miller theorem (1958) states that in a perfect market with symmetric information, the market value of all the securities issued by a firm is independent of the firm's source of finance and consequently firms could go either to the banking sector or to the stock markets to finance their capital. However, asymmetric and imperfect information dominates in the real world. Some countries also distort the financing choices through taxes, subsidies and regulations. Thus, debt or equity financing does matter.

From the "supply of funds" point of view, in the short run the relationship might be negative because of arbitrage between interest rates and stock market returns, but in the medium and longer term investors would probably want to diversify their financial assets and spread their savings between the banking sector and stock markets. The substitutes or complements issue could be country specific due to special incentives to obtain debt or equity financing.

This complements or substitutes issue has been addressed by many researchers. For example, Boyd and Smith (1996) suggest that stock markets and banks may act as complements rather than as substitute sources of capital. Demirguc-Kunt and Levine (1996a) find that across countries the level of stock market development is positively correlated with development of financial intermediaries. Thus, they conclude that stock markets and financial institutions are generally complements and they growth simultaneously.

In contrast, Garcia (1986) finds that many developing countries have had many episodes of intermittent monetary policies with immediate consequences on banking credit. By changing credit in an exogenous way the central bank may create a negative correlation between banking credit and other sources of finance.

To evaluate whether stock market development is significantly correlated with financial intermediary development, we include the measures of financial intermediary development in the regressions. Two empirical indicators are used to measure the financial intermediary development. One is domestic credit to the private sector divided by GDP, and the other is the ratio of broad money supply M3 to GDP.

We use liquid liabilities of the financial system to proxy M3. Liquid liabilities consist of currency held outside the banking system plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries. The M3 to GDP ratio is an indicator of the size of the banking sector in relation to the economy as a whole. This indicator has been used in several studies of the effect of the financial sector on economic growth.[11] In contrast, domestic credit to the private sector divided by GDP measures the role of banks in provision of longer-term financing to private corporations.

Fifth, consider *stock market liquidity.* Liquidity is usually defined as the ease and speed at which agents can buy and sell securities. It is one of the most important functions the stock markets provide (Miller, 1991). Many high-return projects require a long-run commitment of capital, which bears higher default and liquidity risks. Investors are generally reluctant to take these risks. Thus, without liquid stock markets less investment may occur to the high-return projects. In contrast, liquid stock markets allow investors to alter their portfolios quickly and cheaply, it makes investment less risky and facilitates longer-term, more profitable investments (Levine (1991) and Bencivenga, Smith and Starr (1996)). Consequently, the more liquid the stock

[11] For example, see King and Levine (1993a, b, c), and Levine and Zervos (1998).

market, the larger amount of savings are channeled through stock markets. [12] Therefore, we expect a more liquid market to lead to higher market capitalization.

We measure the stock market liquidity in two ways. First, we compute the ratio of total value traded to GDP. This ratio measures the value of equity transactions relative to the size of the economy. Second, we compute the ratio of the total value traded divided by market capitalization. This ratio, frequently called the turnover ratio, measures the value of equity transactions relative to the size of the equity market.

These two liquidity indicators do not directly measure how easily investors can buy and sell securities at posted prices. However, they do measure the degree of trading in comparison to the size of both the economy and the market. Therefore they positively reflect stock market liquidity on an economy wide and market wide basis. Moreover, these two measures complement each other. For example, in Indonesia the ratio of value traded to GDP is 1.8%, but the turnover ratio is 219%, which means that Indonesia has a small but active market. In contrast, Taiwan has the value traded to GDP ratio 151%, but turnover ratio 24%, which means that Taiwan has a big but relatively inactive market.

Sixth, consider *macroeconomic stability.* General macroeconomic stability may well be an important factor for the development of the stock market. We expect that the higher the volatility of the underlying economic situation the less incentive firms and savers would have to participate in the market. With the high instability found in many developing countries, particularly during the seventies and eighties, stock markets became more opaque. Prices become signals with large standard deviations which make it very difficult to assert whether price changes were temporary or permanent, and markets become more uncertain and prone to attract mostly “gamblers”.

[12] In contrast, some economists regard liquidity as retarding growth by reducing uncertainty and consequently precautionary savings and by lowering investors’ search incentives because it would be easier for them to get out fast. Also liquidity would reduce shareholders incentives to control managers due to their short-run commitment to the corporation.

Furthermore, the profitability of corporations can experience sharp movements due to unexpected changes in economic policies such as monetary policy, fiscal policy, exchange rate policy and trade policy. Hence, we expect that stock markets in countries with volatile macroeconomic conditions would also have volatile price indexes and market capitalization.

Theoretically both stock market volatility and macroeconomic volatility are hypothesized to have negative effects on stock market capitalization. But, due to data limitations in stock market volatility, we only examine the effects of macroeconomic stability in this paper.[13] Even though the effects of macroeconomic volatility on market capitalization might be ambiguous, we expect high volatility to have a negative effect on market capitalization.[14]

To evaluate the effects of macroeconomic stability on market capitalization, we use three proxies for macroeconomic stability: inflation rate, inflation change, and the standard deviation of inflation rate. First, we use the inflation rate to measure macroeconomic stability. In addition to current inflation rate, we also consider expectation and examine the effect of last year's inflation rate. Second, we use the difference of inflation rates to measure macroeconomic stability. We calculate the change of this year's inflation rate from last year. Inflation change is used because we believe that high, stable inflation may not represent much instability, but inflation rates that bounce around a lot probably do represent macroeconomic instability. Third, we calculate the standard deviation of twelve-month inflation rate. Both current and last year's standard deviation values are examined.

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[13] Stock market volatility is usually measured by standard deviation of stock market price index or return. We have difficulty getting data for some countries in the sample for early 1980s.

[14] Demirguc-Kunt and Levine (1996b) claim that "greater volatility (in the stock market) is not necessarily a sign of more or less stock market development. Indeed, high volatility could be an indicator of development."

IV. Empirical Evidence

A. Summary Statistics

Table 1 presents the summary statistics of some empirical indicators from 1980 to 1995. The average market capitalization is higher in most East Asian countries than in Latin American countries. Except for Indonesia whose market capitalization is 5%, Korea, Malaysia, the Philippines, Taiwan and Thailand all have market capitalization more than 10%. Malaysia has market capitalization of 108%, which means that market capitalization value is higher than GDP, indicating a large stock market in Malaysia. In contrast, in Latin America, except for Chile whose market capitalization is 28%, Argentina, Brazil, Colombia, Mexico, Peru, and Venezuela all have market capitalization lower than 10%.

Table 1 also lists the saving and investment rates. Saving and investment rates are higher in most East Asian countries than in Latin American countries. The GDP-weighted aggregate saving rate is 23% in Latin America and 31% in East Asia. The GDP-weighted aggregate investment rate is 21% in Latin America and 29% in East Asia. Table 1 shows that, from 1980 to 1995, the banking sector is more developed in East Asia than in Latin America. Both domestic credit to the private sector divided by GDP and liquid liabilities of the financial intermediaries divided by GDP are higher in most East Asian countries than in Latin American countries. For example, except for Chile and Venezuela, all other Latin American countries have the domestic credit to GDP ratio lower than 20%. In contrast, except for Indonesia, Korea and the Philippines, all other East Asian countries have the ratio higher than 50%.

Similarly, in terms of the ratio of liquid liabilities to GDP, except for Venezuela, all other Latin American countries have the ratio lower than 35%. In contrast, except for Indonesia and the Philippines, all other East Asian countries have the ratio higher than 40%. Notice that Japan, Malaysia and Taiwan have well-developed financial intermediaries as their liquid liabilities to GDP ratios are higher than 100%. In contrast, Argentina, Brazil, Colombia,

Table 1. Summary Statistics (mean and standard deviation) of MC/GDP, GDS/GDP, GDI/GDP, VT/GDP, CPR/GDP, and M3/GDP, 1980-95.

Country	MC/GDP		GDS/GDP		GDI/GDP		VT/GDP		CPR/GDP		M3/GDP	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Latin America	0.07	0.06	0.23	0.02	0.21	0.02	0.05	0.04	0.16	0.04	0.21	0.05
Argentina	0.03	0.03	0.20	0.03	0.19	0.03	0.02	0.02	0.13	0.04	0.12	0.04
Brazil	0.05	0.04	0.23	0.03	0.21	0.02	0.06	0.05	0.15	0.06	0.19	0.10
Chile	0.28	0.26	0.23	0.07	0.22	0.06	0.04	0.04	0.49	0.12	0.33	0.04
Colombia	0.06	0.06	0.21	0.03	0.20	0.02	0.01	0.01	0.16	0.01	0.29	0.03
Mexico	0.09	0.10	0.23	0.04	0.22	0.03	0.07	0.07	0.16	0.10	0.23	0.05
Peru	0.05	0.05	0.23	0.05	0.24	0.05	0.01	0.02	0.06	0.03	0.12	0.05
Venezuela	0.06	0.05	0.24	0.04	0.20	0.06	0.01	0.02	0.21	0.07	0.44	0.13
East Asia	0.20	0.19	0.31	0.02	0.29	0.03	0.50	0.52	0.51	0.15	0.60	0.17
Indonesia	0.05	0.09	0.30	0.03	0.28	0.02	0.02	0.03	0.27	0.16	0.29	0.12
Korea	0.13	0.11	0.33	0.05	0.33	0.04	0.27	0.24	0.47	0.06	0.44	0.13
Malaysia	1.08	0.82	0.34	0.03	0.33	0.05	0.44	0.70	0.59	0.13	1.01	0.16
Philippines	0.21	0.24	0.19	0.03	0.23	0.04	0.05	0.07	0.25	0.08	0.30	0.07
Taiwan	0.15	0.18	0.31	0.04	0.24	0.04	1.51	1.83	0.82	0.32	1.01	0.36
Thailand	0.15	0.18	0.30	0.05	0.34	0.06	0.20	0.24	0.51	0.19	0.60	0.13
Japan	0.74	0.33	0.32	0.01	0.30	0.02	0.40	0.28	1.02	0.15	1.67	0.21
USA	0.59	0.11	0.14	0.01	0.16	0.02	0.35	0.16	0.67	0.05	0.64	0.04

MC/GDP = Market capitalization to GDP
GDS/GDP = Gross domestic saving to GDP
GDI/GDP = Gross domestic investment to GDP
VT/GDP = Value traded to GDP
CPR/GDP = Domestic credit to the private sector to GDP
M3/GDP = Liquid liabilities (M3 money supply) to GDP

Sources: Emerging Market Data Base of the International Finance Corporation, International Financial Statistics of the International Monetary Fund, IEC Data of the World Bank.

Indonesia, Mexico, and Peru, whose liquid liabilities to GDP ratios are smaller than 30%, have relatively underdeveloped financial intermediaries.

Financial intermediaries in Latin America remained relatively inactive in the 1980s, and started to develop slowly in the 1990s. In contrast, financial intermediaries in East Asia has been developing steadily since early 1980s, and the gap has been increasing steadily over the years. Both measures show that the financial system has been much more developed in East Asia than in Latin America. Till the end of 1995, financial intermediaries in Latin America are not as developed as those in East Asia in the early 1980s.

When we look at the stock market liquidity, from 1980 to 1995, Korea, Malaysia, Thailand, and Taiwan had liquid stock markets, with their total value traded to GDP ratio above 20%. In contrast, Argentina, Colombia, Indonesia, Peru and Venezuela had relatively illiquid stock markets, with their total value traded to GDP ratio below 2%.

Similarly, the turnover ratio was much higher in most East Asian countries. Indonesia, Malaysia, and Thailand all had turnover ratios above 45%, while Chile, Colombia and Peru had turnover ratios below 10%. From 1980 to 1995, the average aggregate turnover ratio is 36% in Latin America and 69% in East Asia. Thus, the capital markets are also more liquid in East Asia according to this measure. The result is consistent with the first measure of value traded to GDP ratio.

During the period considered the inflation rate was much higher in Latin America. The inflation difference has grown since the late 1980s when many Latin American countries experienced high inflation. From 1980 to 1995, the average aggregate inflation rate is 443% in Latin America and 7% in East Asia.

B. Structural Change

As we know, the emerging markets are booming in the 1990s. We break the data into two sub-periods, from 1980 to 1991 and from 1992 to 1995, to examine if dramatic structural change exists. Table 2 presents the

Table 2. The difference in mean and standard deviation for MC/GDP, VT/GDP before and after 1991. (1980-1995)

Country	MC/GDP (1980-91)		MC/GDP (1992-95)		VT/GDP (1980-91)		VT/GDP (1992-95)	
	mean	std. dev.	mean	std. dev.	mean	std. dev.	mean	std. dev.
Latin America	3.45	2.14	15.71	2.79	2.91	1.52	10.17	3.12
Argentina	1.68	1.50	7.26	1.22	0.86	0.84	4.13	2.13
Brazil	2.76	1.52	10.99	3.43	4.28	3.02	12.44	5.85
Chile	14.94	12.41	66.05	15.17	1.88	1.52	9.35	5.25
Colombia	3.30	1.39	15.12	4.46	0.29	0.24	1.81	0.96
Mexico	3.83	3.81	23.41	5.44	3.61	3.68	16.52	4.00
Peru	3.39	2.24	11.09	5.32	0.47	0.41	4.50	2.57
Venezuela	4.86	4.78	11.04	4.44	1.00	2.05	2.44	1.63
East Asia	11.16	7.08	47.70	15.76	40.40	55.17	77.81	28.91
Indonesia	1.05	1.97	17.99	9.45	0.53	1.14	5.61	1.95
Korea	8.78	9.88	24.05	5.46	17.38	17.88	54.27	18.09
Malaysia	66.76	21.95	231.60	69.82	12.10	6.84	137.75	91.93
Philippines	9.24	6.27	56.05	25.48	2.12	1.73	14.98	7.28
Taiwan	6.05	5.34	42.81	14.72	141.48	208.50	177.78	80.33
Thailand	6.07	6.00	40.95	18.76	8.52	10.90	56.12	15.70
Japan	74.73	38.53	71.76	5.00	45.30	30.30	22.30	3.39
United States	53.39	6.16	75.73	4.76	29.39	12.39	52.35	14.68

Note: Values are percentage points.
MC/GDP = Market capitalization to GDP
VT/GDP = Value traded to GDP

Sources: The Emerging Market Data Base of the International Finance Corporation and the IEC Data of the World Bank.

mean and standard deviation of market capitalization and value traded to GDP ratio for these two sub-periods. We find that capital markets have been growing very fast since the 1990s. The GDP-weighted aggregate market capitalization grew from 3.5% to 15.7% in Latin America and from 11.2% to 47.7% in East Asia. The GDP-weighted aggregate value traded to GDP ratio grew from 2.9% to 10.2% in Latin America and from 40.4% to 77.8% in East Asia.

C. Regression Results

Table 3 summarizes the results of regressions on determinants of market capitalization from pooled data on fifteen countries from 1980 to 1995. Column 1 presents the results when we only include last year's income, last year's saving rate, domestic credit to the private sector divided by GDP, and last year's value traded to GDP ratio in the regression. We use it as the basic regression. The result shows that all these four variables have positive and significant effects on market capitalization.

When last year's income level increases by one billion dollars, market capitalization increases by 0.007 percentage point. Thus, the income level propels stock market development. When last year's saving rate increases by one percentage point, market capitalization increases by 0.879 percentage point, which implies that most of the increase in savings is channeled through the stock markets.

If domestic credit to the private sector divided by GDP increases by one percentage point, market capitalization increases by 0.527 percentage point. Thus, financial intermediary development promotes stock market development. If value traded to GDP ratio increases by one percentage point, market capitalization increases by 0.133 percentage point. Therefore, stock market liquidity also has a positive effect on market capitalization.

To test the effects of the investment rate on stock market capitalization, regression (2) includes last year's investment rate instead of saving rate. All four variables — the income level, investment rate, domestic credit to the

Table 3. Regressions on determinants of market capitalization from pooled data

Regression No.	(1)	(2)	(3)	(4)	(5)
Last year income	0.007 (2.263) [0.025]	0.008 (2.438) [0.016]	0.008 (2.319) [0.021]	0.008 (2.284) [0.023]	0.007 (2.258) [0.025]
Last year savings rate	0.879 (2.359) [0.019]		0.758 (1.979) [0.049]	0.794 (2.064) [0.040]	0.885 (2.358) [0.019]
Last year investment rate		1.043 (2.839) [0.005]			
Credit to private sector to GDP ratio	0.527 (3.867) [0.000]	0.446 (3.224) [0.001]		0.682 (5.128) [0.000]	0.526 (3.853) [0.000]
Liquid liabilities to GDP ratio			0.323 (2.421) [0.016]		
Last year value traded to GDP ratio	0.133 (4.108) [0.000]	0.136 (4.229) [0.000]	0.149 (4.443) [0.000]		0.133 (4.100) [0.000]
Last year turnover ratio				0.081 (2.070) [0.040]	
Inflation change					-0.0004 (-0.157) [0.875]
R^2	0.69	0.69	0.68	0.67	0.69

Note: Regression results are from pooled estimation. Fixed effects are employed in the regressions. See Appendix I for the constants from fixed effects. The dependent variable is the ratio of market capitalization to GDP. The t-statistics are in parentheses, and the P-values are in brackets. Data are for twenty countries for 1980-95. Each regression has two hundred and forty observations. The twenty countries are Argentina, Brazil, Chile, Colombia, Indonesia, Japan, Korea, Mexico, Malaysia, Peru, the Philippines, Taiwan, Thailand, the United States, Venezuela.

Source: The IEC Data of the World Bank, the International Financial Statistics (IFS) of the International Monetary Fund (IMF), the Emerging Market Data Base (EMDB) of the International Finance Corporation (IFC), and the authors' calculations. Rate of inflation: calculated from the consumer price index (CPI). CPI is line 64...ZF from the IFS. GDP weight is GDP at market prices in 1987$ — NY.GDP.MKTP.KD.87 from the World Bank-IEC Data from the International Economics Department.

Table 3. (Continue) Regressions on determinants of market capitalization from pooled data

Regression No.	(6)	(7)	(8)	(9)	(10)
Last year income	0.008 (2.433) [0.016]	0.008 (2.445) [0.015]	0.008 (2.435) [0.016]	0.007 (2.197) [0.029]	
Last year savings rate				1.132 (3.056) [0.003]	1.021 (2.742) [0.007]
Last year investment rate	1.215 (3.339) [0.001]	0.951 (2.519) [0.012]	1.053 (2.842) [0.005]		
Credit to private sector to GDP ratio		0.609 (4.522) [0.000]	0.445 (3.201) [0.002]	0.521 (3.923) [0.001]	0.597 (4.605) [0.000]
Liquid liabilities to GDP ratio	0.323 (0.131) [2.477]				
Last year value traded to GDP ratio	0.143 (4.351) [0.000]		0.136 (4.223) [0.000]	0.131 (4.167) [0.000]	0.129 (4.089) [0.000]
Last year turnover ratio		0.085 (2.201) [0.029]			
Inflation change			-0.0005 (-0.241) [0.810]		
Dummy Variable for structural change				16.286 (3.507) [0.001]	14.549 (3.066) [0.002]
Income growth rate					0.809 (2.136) [0.034]
R^2	0.69	0.67	0.69	0.71	0.69

Note: Regression results are from pooled estimation. Fixed effects are employed in the regressions. See Appendix I for the constants from fixed effects. The dependent variable is the ratio of market capitalization to GDP. The t-statistics are in parentheses, and the P-values are in brackets. Data are for twenty countries for 1980-95. Each regression has two hundred and forty observations. The twenty countries are Argentina, Brazil, Chile, Colombia, Indonesia, Japan, Korea, Mexico, Malaysia, Peru, the Philippines, Taiwan, Thailand, United States and Venezuela.

Source: The IEC Data of the World Bank, the International Financial Statistics (IFS) of the International Monetary Fund (IMF), the Emerging Market Data Base (EMDB) of the International Finance Corporation (IFC), and the authors' calculations. Rate of inflation: calculated from the consumer price index (CPI). CPI is line 64...ZF from the IFS. GDP weight is GDP at market prices in 1987$ — NY.GDP.MKTP.KD.87 from the World Bank-IEC Data from the International Economics Department.

private sector divided by GDP, and value traded divided by GDP — have positive and significant effects on market capitalization. This regression indicates that beside saving rate, the investment rate is also a good predicator of market capitalization. When last year's investment rate increases by one percentage point, the market capitalization increases by 1.043 percentage point, which implies that the stock markets might develop faster than the financial intermediaries, and more funds are channeled through the stock markets.

To test the effects of another measure of financial intermediary development on market capitalization, regression (3) includes liquid liabilities to GDP ratio instead of domestic credit to the private sector to GDP ratio. The income level, saving rate, the liquid liabilities to GDP ratio, and the value traded to GDP ratio all have positive and significant effects on market capitalization. When liquid liabilities to GDP ratio increases by one percentage point, market capitalization increases by 0.323 percentage point, which means that financial intermediary development has a positive effect on market capitalization.

Comparing regressions (1) and (3), we find that both measures for financial intermediary development have positive and significant effects on stock market capitalization. In addition, domestic credit to the private sector divided by GDP seems to be a better measure of financial intermediary development and a better predictor of market capitalization. This is consistent with our expectations. As argued by De Gregorio and Guidotti (1995), domestic credit to the private sector to GDP ratio has a clear advantage over measures of monetary aggregates such as M1, M2, or M3, in that it more accurately represents the actual volume of funds channeled into the private sector.

To test the effects of another measure of stock market liquidity, regression (4) includes last year's turnover ratio instead of the ratio of value traded to GDP. The turnover ratio has a positive and significant effect on stock market capitalization, while the effects of all other variables do not change. When

last year's turnover ratio increases by one percentage point, market capitalization increases by 0.081 percentage point.

Comparing regressions (1) and (4), we can see that the value traded to GDP ratio is a better measure of stock market liquidity, and plays a more important role in determining stock market capitalization.

We add measures of macroeconomic stability to the basic regression. In regression (5) we include the difference in inflation rate. The income level, saving rate, domestic credit to the private sector divided by GDP, and value traded to GDP ratio have positive and significant effects on market capitalization. However, the change in inflation has a negative and insignificant effect on market capitalization, which indicates that macroeconomic stability does not play an important role in determining market capitalization.

In addition to the change in inflation, we also employ other measures of macroeconomic stability, such as current and last year inflation rates, the standard deviations of current and last year's 12 month inflation rate. We find that none of these measures has a significant effect on market capitalization[15]. Similarly, Singh (1997) finds that the negative effects of stock market volatility "are not supported by the developing countries' experience during the last 15 years."

It has been argued that the investment rate is a better predictor for stock market capitalization than the saving rate. To test this hypothesis, columns (6), (7) and (8) show the results when we employ the investment rate instead of saving rate in regression (3), (4) and (5). In each of these regressions, all variables have positive and significant effects on market capitalization. Moreover, the results seem to show that the investment rate is a better predictor of market capitalization than the saving rate.

To test the effects of structural change, we add a dummy variable into the

[15] Using monthly data to measure volatility, Demirguc-Kunt and Levine (1996b) find that volatility is significantly negatively correlated with all the indicators of financial intermediary development.

basic regression. This dummy variable is defined as 0 for all East Asian countries from 1980 to 1995, 0 for Latin American countries from 1980 to 1990, and 1 for Latin American countries from 1991 to 1995. It is designed to reflect the effect of privatization in Latin America in the 1990s. Regression (9) shows that beside the basic determinants, the dummy variable also has a positive and significant effect on market capitalization, which indicates that the privatization in Latin America in the 1990's plays an important role in determining market capitalization.

In regression (10) we include the real income growth rate instead of the income level. As the income growth rate increases by one percentage point, market capitalization increases by 0.809 percentage point. Not surprisingly, the income growth rate is also an important predicator of market capitalization.

In summary, two interesting results are obtained from the above regressions. First, the real income level or growth rate, the saving or investment rate, financial intermediary development (measured by both domestic credit to the private sector divided by GDP and liquid liabilities divided by GDP), stock market liquidity (measured by both the value traded divided by GDP and turnover ratio), and the structural change in Latin America are important predicators of stock market capitalization. Second, macroeconomic stability (measured by the inflation level, the change in inflation, and the standard deviation of 12 month inflation rate) does not play an important role in market capitalization determination.

D. Correlations

Using a different data set, Demirguc-Kunt and Levine (1996b), and Levine and Zervos (1998) have shown that measures of stock market development are positively correlated with measures of financial intermediary development. We examine if this complementary relationship exist in our study. Data permitting, we average the data over the 1980-1995 period so

that each country has one observation per variable. We compute the correlation between stock market development (measured by market capitalization) and financial intermediary development (measured by both domestic credit to the private sector as a percentage of GDP and liquid liabilities as a percentage of GDP).

The correlation between market capitalization and domestic credit to the private sector divided by GDP is 0.66, and the correlation between market capitalization and liquid liabilities divided by GDP is 0.73. Both correlations are significant. The P-values are 0.007 and 0.002 respectively. Thus, our data set confirms the finding of Demirguc-Kunt and Levine (1996b). The financial intermediary development and stock market development are complements rather than substitutes.

V. Policy Implications and Conclusions

This paper empirically explored the determinants of stock market development, particularly market capitalization. It also examined the relationship between financial intermediary development and stock market development. We use pooled data for a sample of fifteen industrial and developing countries from 1980 to 1995. These fifteen countries include Argentina, Brazil, Chile, Colombia, Indonesia, Japan, Korea, Malaysia, Mexico, Peru, the Philippines, Taiwan, Thailand, United States and Venezuela.

We measure stock market liquidity by the ratio of total value traded to GDP and the turnover ratio and financial intermediary development by the ratio of liquid liabilities to GDP and domestic credit to the private sector divided by GDP. We use the inflation level, inflation change and standard deviation of 12 month inflation rate to measure the macroeconomic stability.

We find that the real income level, saving rate, financial intermediary development, and stock market liquidity are important predictors of market capitalization, while macroeconomic stability does not prove significant. We

also confirm that financial intermediaries and markets are complements instead of substitutes.

These findings explain the differences in market capitalization in East Asia and Latin America. We observe a more developed stock market in East Asia. The results in this paper suggest that this is due to the sustained economic growth, the higher saving rate, the more liquid stock market, and the more developed banking sector in East Asia.

These findings also have important policy implications for Latin American countries. First, the evidence indicates that economic development plays an important role in stock market development. Thus, it is important to liberalize the economy when undertaking financial liberalization.

Second, the saving rate also plays an important role in determining market capitalization. One of the reasons that most Latin American countries have a smaller stock market than East Asian countries is their low saving rate. To promote stock market development, Latin American countries can encourage savings and investment by appropriate policies.

Third, stock market liquidity has a positive effect on market capitalization. In most Latin American emerging markets, low liquidity hinders the development of stock market. Improving liquidity would be another approach through which the Latin American countries can promote their stock market development.

Fourth, the stock market is a complement rather than substitute for the banking sector. Developing financial intermediaries can promote stock market development. Many East Asian countries are successful examples.

This research can be further extended along two lines. One is to include the OECD countries in the sample. The other is to incorporate regulatory and institutional factors in the study.

Appendix I: Constants from the Fixed Effects Regressions

	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5
Argentina	-23.17	-23.96	-18.02	-25.65	-23.29
Brazil	-26.47	-27.05	-22.11	-29.43	-26.60
Chile	-18.01	-17.13	-0.48	-23.80	-18.12
Colombia	-20.36	-21.29	-19.06	-21.74	-20.48
Mexico	-22.66	-24.53	-19.02	-26.73	-22.79
Peru	-17.69	-20.92	-15.95	-17.16	-17.83
Venezuela	-27.30	-24.97	-27.84	-29.11	-27.44
Indonesia	-37.59	-37.63	-28.82	-56.48	-37.76
Korea	-45.25	-47.06	-31.36	-48.32	-45.42
Malaysia	41.83	42.98	43.39	33.24	41.66
Philippines	-10.61	-15.15	-5.10	-14.20	-10.71
Taiwan	-75.54	-67.33	-63.42	-68.74	-75.69
Thailand	-40.15	-45.13	-29.65	-48.29	-40.30
Japan	-30.40	-27.03	-28.53	-39.12	-30.53
United States	-26.57	-27.78	-12.97	-32.92	-26.62
	Reg 6	Reg 7	Reg 8	Reg 9	Reg 10
Argentina	-25.62	-26.69	-24.14	-33.43	-31.74
Brazil	-30.11	-30.31	-27.23	-37.13	-34.84
Chile	-9.91	-23.24	-17.27	-28.47	-33.04
Colombia	-27.03	-22.80	-21.46	-30.53	-31.71
Mexico	-28.76	-28.86	-24.73	-33.49	-31.47
Peru	-26.16	-20.31	-21.14	-28.37	-26.97
Venezuela	-33.76	-27.25	-25.14	-38.67	-37.46
Indonesia	-39.71	-57.74	-37.88	-45.33	-48.83
Korea	-46.23	-50.29	-47.32	-53.12	-58.16
Malaysia	30.51	33.68	42.75	33.58	27.68
Philippines	-18.03	-18.63	-15.35	-15.56	-16.63
Taiwan	-68.58	-61.25	-67.46	-82.82	-90.48
Thailand	-47.70	-53.34	-45.39	-47.14	-53.67
Japan	-41.45	-36.32	-27.18	-36.97	-27.31
United States	-22.33	-34.20	-27.86	-28.00	-1.39

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